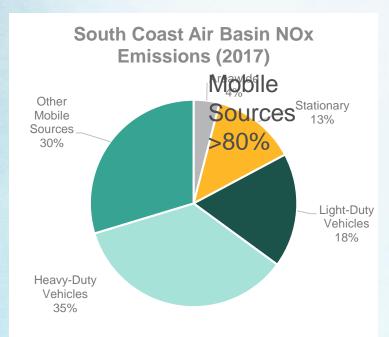
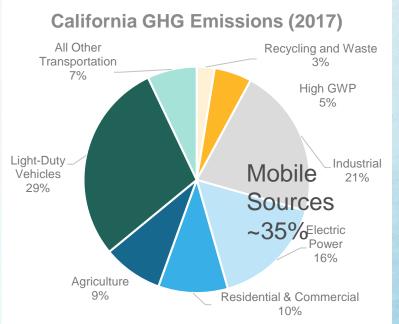


A Vision for Minimizing Real-World Emissions in the On-Road Sectors

November 15, 2018 Sacramento, CA

After 50 years of standards, mobile source emissions still significant share of inventory



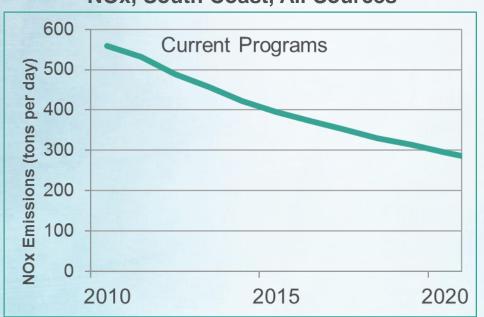


Mobile sources represent ~50% of GHG inventory when including emissions from fuel production

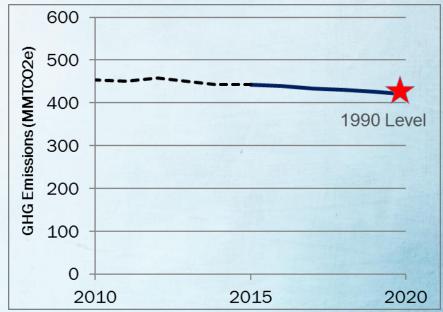


Current programs have achieved significant reductions

NOx, South Coast, All Sources



GHGs, Statewide, All Sources





Reductions Achieved via Many Individual Elements

Certification

- Design Review
- Emission data
- Durability data
- OBD
- AECDs
- Warranty

Early Vehicle Life

- Manufacturer
 Testing: Assembly
 line, IUVP, HDIUT, OBD
 PVE/MST
- CARB Testing:
 IUCP, HD NTE, OBD confirmatory testing
- Warranty Reporting

Mid-Vehicle Life

- Manufacturer
 Testing: IUVP,
 OBD MST
- CARB
 Testing: HD NTE
- Inspection/ Maintenance: Smog Check, HDVIP, PSIP

Late Vehicle Life

- Inspection/ Maintenance:
 Smog Check, HDV
- Smog Check, HDVIP, PSIP
- CARB Testing: EMFAC, Smog Check Support
- Fleet turnover:

Truck & Bus rule, incentives

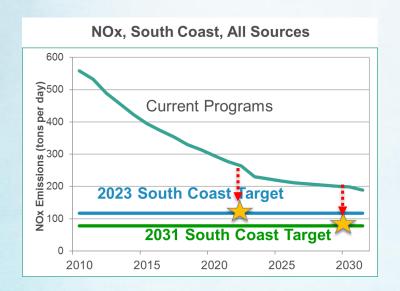
CARB Testing

- Research/Lab Studies
- PEMS on-road
- Tunnel/Remote Sensing
- Data Logging
- Ambient Air Quality
- Regulatory Development

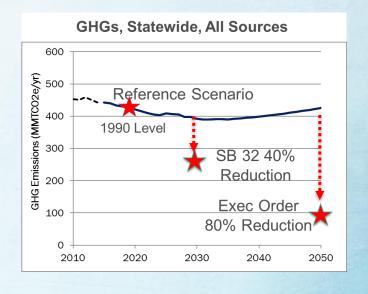


But we still need more

- South Coast Ozone
- San Joaquin Valley PM & Ozone

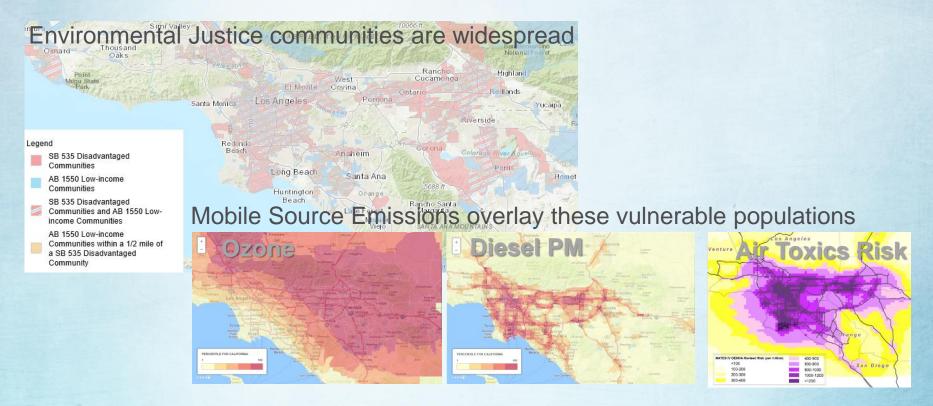


Statewide GHGs



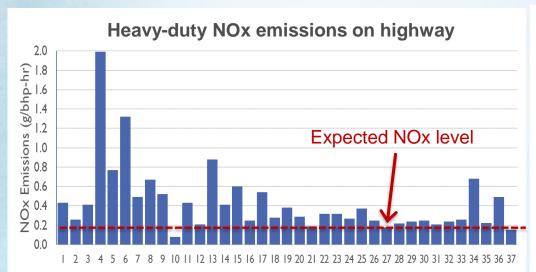


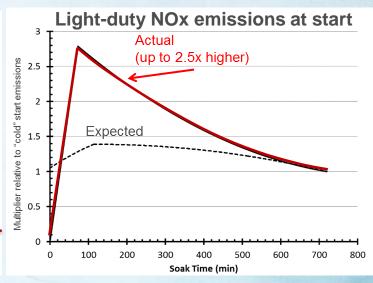
And in the most critical areas





And we need to do better... Some are still not performing as expected







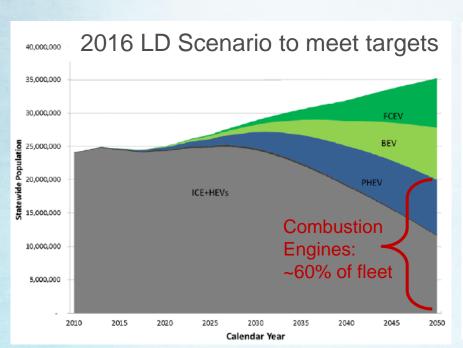
THE WALL STREET JOURNAL.

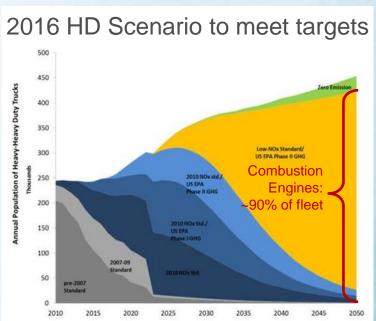
Volkswagen Pleads Guilty to Criminal Charges in Emissions-Cheating Scandal



How do we do more?

Electrification is ultimate solution but Combustion Engines still dominant for decades

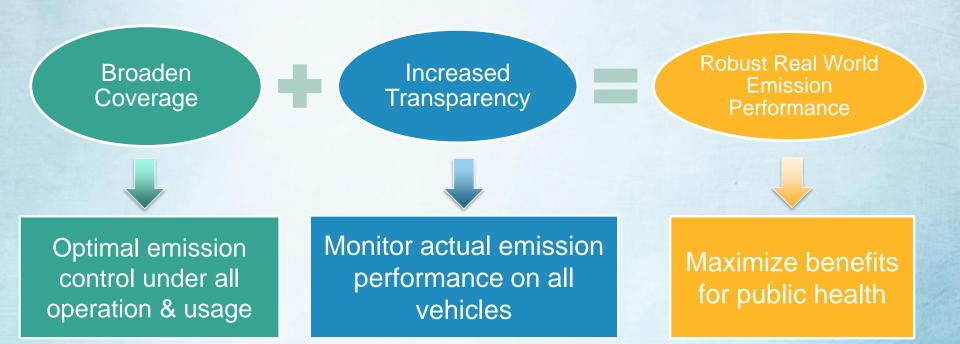






How do we do better?

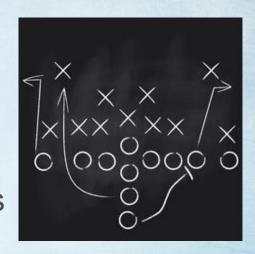
Focus on Real World Emission Performance





Game Plan

- Already Implemented:
 - Refocus Actions within Existing Programs
- □ Next Steps:
 - Re-design Standards and In-Use Programs
- □ Longer Term:
 - Leverage New Technology and Data



Examples:Already Implemented

Broaden Coverage



Enhanced Design Review



Defeat Device Testing

Increased Transparency



Increased Testing

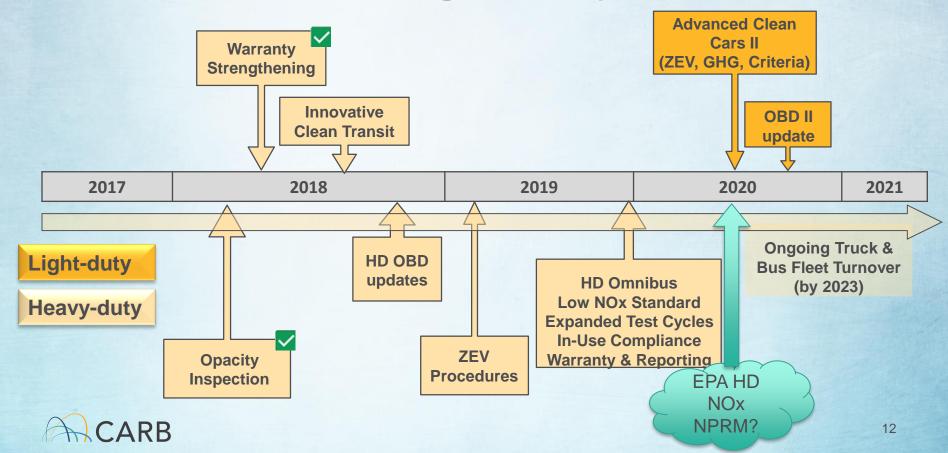
LDV CO₂ On-Vehicle Data

Remote Sensing





Next steps: Regulatory Schedule



Next Steps: Expanding Testing



- New Southern California Laboratory
 - Increased HD and LD labs
 - On-road PEMS & OBD testing

Scheduled for 2021 opening





Next steps: REAL Concept

Real Emissions Assessment Logging

- Require vehicles to track emission performance
 - Add software to store aggregated data on vehicle
- Start with existing sensors
 - Accuracy of on-board NOx sensors already within 15%
 - Fuel usage (to infer CO₂ emissions) already even more accurate
- Potential benefits:
 - Comprehensive feedback
 - More efficient than laboratory or PEMS testing
 - Future standards linked to on-road performance



Longer term: Future Strategy Direction

- Further expand coverage with vehicle data
 - Enabling focused actions to achieve needed emission reductions
- Adapt to technology and societal usage changes
- Transfer technology to other Mobile Source sectors





A Vision for Minimizing Real-World Emissions in the On-Road Sectors

END